Simulation of natural convection heat transfer in an enclosure by the lattice-Boltzmann method

Abstract:

This paper presents the simulation of natural heat convection in an enclosure using Cubic-Interpolated-Pseudo-Particle (CIP) lattice-Boltzmann method. A D2Q9 lattice model was coupled with the simplest D2Q4 lattice model to represent density and internal energy distribution function, respectively. The effects of the Rayleigh number on the flow pattern were studied. The enclosure is filled with air heated by a small localized source of heat at two different positions on the bottom wall. The results explain the mechanism of natural convection rate increasing due to the Rayleigh number and heat source position changing. The comparison of the results was in excellent agreement with results from the literature.